Taylor Lamechea Dr. Gustafson MATH 360 HW 5

10.7 #9,12

Problem 10.7.9 
$$\iint_{S} \vec{F} \cdot \vec{n} \, dA = \iiint_{S} \vec{\nabla} \cdot \vec{F} \, dv$$

$$\vec{F} = \begin{bmatrix} x^2, 0, z^2 \end{bmatrix} -1 \leq x \leq 1, -3 \leq y \leq 3, \quad 0 \leq z \leq 2$$

$$\vec{\nabla} \cdot \vec{F} = \begin{bmatrix} 0 \\ 0 \times 1, \theta y \end{bmatrix}, \frac{0}{2z} \end{bmatrix} \cdot \begin{bmatrix} x^2, 0, z^2 \end{bmatrix} = \frac{0}{2x} x^2 + \frac{0}{2y} 0 + \frac{0}{2z} z^2$$

$$\vec{\nabla} \cdot \vec{F} = 2x + 2z \quad \therefore \quad \int_{0}^{2} \int_{-3}^{3} \int_{-1}^{1} 2x + 2z \, dx dy dz$$

$$(1^2 + 2z) - (1^2 - 2z) \qquad \int_{0}^{2} \int_{-3}^{3} \begin{bmatrix} x^2 + 2zx \end{bmatrix}_{-1}^{1} dy dz$$

(4Z(3)) - (4(<del>Z</del>)(-3))

$$\vec{\nabla} \cdot \vec{F} = 2 \times + 2 \vec{z} \quad \int_{0}^{2} \int_{-3}^{3} \int_{-1}^{1} 2 \times + 2 \vec{z} \, dx \, dy \, dz$$

$$(1^{2} + 2 \vec{z}) - (1^{2} - 2 \vec{z}) \quad \int_{0}^{2} \int_{-3}^{3} \left[ x^{2} + 2 \vec{z} \times \right]_{-1}^{1} \, dy \, dz$$

$$(4z(3)) - (4(z)(-3)) \quad \int_{0}^{2} \int_{-3}^{3} 4z \, dy \, dz$$

$$24z \quad \int_{0}^{2} \left[ 4zy \right]_{-3}^{3} \, dz$$

$$\int_{0}^{2} 24z \, dz$$

$$|2z^{2}|_{0}^{2} = |2(4) - |2(0)| = 48$$

div(f) = 2x+22: 48

```
Problem 10.7.12 | Find A = III V.Fdv
  \left(\begin{array}{c} 1 \\ -7 \end{array}\right) = \left[\begin{array}{c} x^3 \\ y^3 \\ y^3 - 2^3 \end{array}\right] Spherical ! \Gamma = 5
             div(f) = V.f= /8x, 84, 82]. [x3-y3, y3-23, 23-x3]
   div(\vec{F}) = \frac{2}{2x}(x^3 - y^3) + \frac{2}{2y}(y^3 - z^3) + \frac{2}{2z}(z^3 - x^3) = 3x^2 + 3y^2 + 3z^2
OE[0,76] ØE[0,29]
                                    3(x^2+4^2+7^2)
                                   3( 525in20 cos20 + 525in20-5in20 + 52cos20) dy
 X= rsin o-cos $
 y= rsinosinø
 7=rcoso
               [297 ] 5 3(12 sin 20 cos2 x + 12 sin20 sin2 x + 12 cos20) 13 in a drdodx
              3/27/12/5 145in30cov20+145in305in20+145in0cos20 drdodo
                           r45in30(cos20+5in20)+r45in0-cos20
                              145in30(1) + 145in0 co320
                              145in O (Sin20 + Cos20)
                                   c45ino (1)
                3 [28] 5 ry sino drdodø
                 3\int_{0}^{2\pi}\int_{0}^{\pi}\frac{r^{5}}{5}\sin\phi | \int_{0}^{5}d\phi d\phi
                   3.625 JOT - COS(0) 1/2 CO
                           \int_{0}^{2\pi} 1875 \, d\phi = 1875 \, \phi \Big|_{0}^{2\pi} = 3750 \, \text{m}
```

 $div(\vec{F}) = [3x^2, 3y^2, 3z^2] : 3750 \text{ m}$